

Situation on Dengue Fever and Dengue Haemorrhagic Fever in The Western Pacific Region

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Abstract : Dengue fever and dengue haemorrhagic fever (DF/DHF) is now recognized as one of the major public health problem in most of the countries in the Western Pacific Region (WPR) such as China, Philippines, Malaysia, Singapore, Viet Nam, Cambodia, Lao PDR and the South Pacific Countries. DF existed before World War II in the South-East Asia, however, the number of patients have increased steadily and in 1960s dengue virus infection have spread rapidly in Asia, the Pacific Islands, Africa and Central- and South-America. In the WPR, 28/35 countries and areas experienced DF/DHF outbreak in the past two decades. Case fatality rate become to low (0–3%) in every country now except Cambodia (3.6–12.4%), however, the number of cases have been increasing again and deaths are still reported every year. The forty-sixth World Health Assembly, WHO, in May 1993 called for global action to control DF/DHF.

The Western Pacific Regional Office (WPRO) of WHO have supported DF/DHF prevention and control programme in the country, however, shortage of trained personal, facility and equipment for clinical and virological diagnosis is a major obstacle in most of the DF/DHF endemic countries.

Key words : dengue fever/dengue haemorrhagic fever, Western Pacific region, epidemiology, prevention and control.

INTRODUCTION

The Western Pacific Region (WPR) of World Health Organization (WHO) is spread over a vast area, extending from China, Japan and the Republic of Korea in the north to Australia and New Zealand in the south, from China, Malaysia and Singapore in the west to Cook Islands and French Polynesia in the east (Fig. 1). Covering nearly one third of the world's population, the WPR is perhaps the most culturally and socially diverse of the 6 regions of WHO. The Region embraces some of the world's least developed countries as

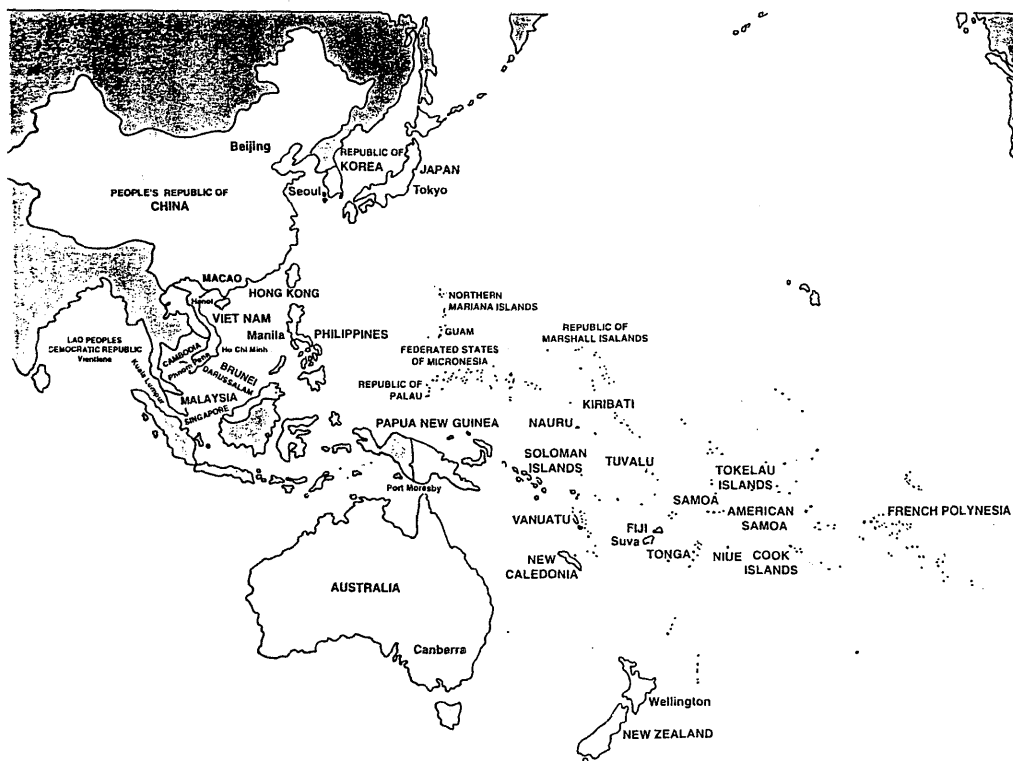


Fig. 1. The Western Pacific Region of the World Health Organization consists of 35 countries and areas, with a total estimated population in 1992 of 1535 million; seven countries account for 96% of this total. The Region has highly industrialized developed countries, newly industrializing countries or areas, developing countries or areas, and some that count among the least developed of developing countries. The regional population is expected to grow to 1700 million by the year 2000. The average national population growth rate was 2.0% per annum for the period 1985-1990.

well as its most rapidly growing economies. Geographically, most of the countries in our Region are located in tropical or subtropical zone.

Relatively little information is available, the presence of dengue fever (DF) or DF like illness was known prior to the World War II in the countries and areas in the WPR such as south China, Indo-China Peninsula, Philippines, Fiji, New Caledonia and some other Pacific Islands. It spread widely during the War throughout the Pacific area and appears to have occurred almost everywhere that *Ae. aegypti* or another suitable *Stegomyia* vector was present.

The first patient of dengue haemorrhagic fever (DHF) was recognized in Manila, Philippines, in 1954 and the number of patients of DF/DHF have increased steadily. In 1960s, dengue virus infection have spread rapidly not only in Asia and the Pacific Islands, but also in Africa and Central- and South-America. In the WPR, 28/35 countries and areas experienced DF/DHF outbreak in the past two decades. DF/DHF is now recognized as

one of the major public health problem in most of the countries in the WPR.

DF/DHF Epidemiological Situation in the WPR since 1940s

DF/DHF epidemiological situation in the WPR since 1940s was summarized in Fig. 2.

China: An epidemic of febrile illness, suspected to be DF, occurred along the south-east coast of China including Shanghai city, however, outbreaks of this DF-like illness

	1940s,	1950s,	1960s,	1970s,	1980s,
China	outbreak in '45	-----	absence-----	outbreak in '78	→ endemic
Japan	endemic '42-'45	→	no endemic report		
Cambodia	?	-----	outbreak in '63	→	endemic
Laos	?	-----			→ endemic since '84
Viet Nam	endemic	-----			→ endemic
Malaysia		outbreak in '54	→	endemic	
Singapore			outbreak in '60	→	endemic
Philippines	endemic	-----			→ endemic
South Pacific	endemic in '40s	----	absence -----		→ endemic
	Fiji		F. Polinesia('64/'69/'71)		
	New Caledonia		Fiji ('71)		
	New Guinea		Kiribati ('71)		
	Samoa		Papua New Guinea ('71)		
	Solomon		Nauru ('72)		
			New Caledonia ('72)		
			Niue ('72)		
			Samoa ('72)		
			Vanuatu ('72)		
			Tonga ('74)		

Fig. 2. DF/DHF epidemiological situation in the WPR since 1940's.

were not reported from 1950 to 1977. Since 1978, epidemics of DF/DHF have been reported and it is now endemic in south China.

Japan : DF outbreak was experienced in Japan in 1942 and the epidemics recurred until 1945 in the main southern part of Japan including Osaka, Kobe and Nagasaki. Data on the actual number of the patients were unclear but it was estimated that 200 000 to 1 to 2 million and in the city of Osaka alone, one third to one half the population fell ill from the disease in 1944 (Sabin, A. B., 1948). The dengue epidemics in Japan from 1942 to 1945 was one of the greatest epidemics ever recorded in a Temperate Zone and was unique in that the disease disappeared after 1945 and no endemic cases have been reported in Japan since. By the retrospective study, dengue virus type 1 (DEN-1) infection was suspected during the time in Japan (Hotta S., 1965).

Cambodia/Lao Peoples Democratic Republic (Lao PDR)/Viet Nam ; DF was known to be widely present in the countries in the WPR in Indo-China Peninsula such as Cambodia, Lao PDR and Viet Nam, however, relatively little information was available due to poor health system.

In Cambodia, the presence of DF was confirmed in 1963, however, no annual data had been received in WHO because national reporting system was initiated in 1980. It is now endemic.

In Lao PDR, endemic was confirmed first in 1984 and large outbreak was recorded in 1985. Since then, endemicity has been reported.

In Viet Nam, an outbreak of severe haemorrhagic disease in children occurred in Hanoi in 1958 and it was suspected as DHF outbreak. DHF-like illness also occurred in south Viet Nam in 1960 and big outbreak of DF was reported in north Viet Nam also in 1960. Since 1975, large scale outbreak has been reported annually from north and south Viet Nam.

Malaysia/Singapore ; In Malaysia, following the outbreak in Kuala Lumpur in 1954, the virus was known to be wide spread. It was first reported on DHF in Malaysia in Penang in 1962 and virus was detected as dengue virus type 2 (DEN-2). An endemic has been reported since 1973.

In Singapore, DF became endemic following the first reported outbreak of the disease in 1960 (Singapore, 1989) and it is now endemic.

Philippines ; Before World War II, endemic of DF was already known in the Philippines. In 1953, new febrile and serious illness among children in Manila and Luzon Island was reported and named "Philippines Hemorrhagic Fever" (Quintos, FN. et al. 1954). Isolation of virus and serological examination were made from these hemorrhagic patients including fatal cases, and these determined to be DF. Following the study in Philippines, an illness named Thailand Haemorrhagic Fever was also confirmed as identical disease

with Philippines Haemorrhagic Fever associated with dengue infection (Hammon, W. McD et al. 1960). It was given the name of dengue haemorrhagic fever/dengue shock syndrome (DHF/DSS). After the initial recognition of DHF in Manila, cases continued to appear each year with considerable year-to-year variation in numbers.

The South Pacific Countries; In the South Pacific, endemic of DF was known in 1940s in Fiji, New Caledonia, New Guinea, Samoa or Solomon. However, it was virtual absence for 20 years after the War. Dengue virus type 3 (DEN-3) outbreak occurred in Tahiti, French Polynesia, and recurred in 1969. Early in 1971, DEN-2 epidemics occurred in Fiji, French Polynesia, Kiribati, and Papua New Guinea, and following it, DF occurred in Nauru, New Caledonia, Samoa and Vanuatu in 1972, In Tonga, a new relatively low intensity epidemic has occurred in 1974. Since then, DF is now endemic in the South Pacific Countries and Areas.

Present DF/DHF Epidemiological situation in the WPR

As shown in the above, the presence of DF or DF like illness was known prior to the World War II in the countries and areas in the WPR and it spread widely during the War throughout the Pacific Area, however, it became to be silence for a time. In 1960s, dengue virus infection has spread rapidly in the Region again. It has been supposed that rapid urbanization in the most of the countries in the Region and rapid increasing number of travellers associated with progress of travel style with aircraft might be the important factors on spreading the vector mosquito and the virus country to country. In 1975-1979, 19 countries/areas in the WPR reported existence of DF/DHF. It was 22 countries/areas in 1980-1984, 26 in 1985-1989 and 19 countries/areas out of 35 member states in the Region from 1990 up to October 1993. Total 28/35 countries and in the WPR such as American Samoa, Australia, Cambodia, China, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Lao PDR, Malaysia, Marshal Islands, Nauru, New Caledonia, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Tokelau, Tonga, Vanuatu, Viet Nam and Willis and Futuna experienced DF/DHF outbreak in the past two decades. There has been no report from Brunei, Hong Kong, Macao, Mariana Islands, Micronesia and Republic of Korea. Japan experienced outbreak of DF in 1940s, however, no outbreak has been reported since 1945 as described on the above.

Fig. 3 to 7 indicate mean annual DF/DHF cases in every five years period from 1960 up to October 1993 in the countries/areas classified geographically in the Region.

China (Fig. 3); DF/DHF had not been reported in China from 1950 to 1977. An epidemic of DF due to dengue virus type 4 (DEN-4) appeared in Foshan city, Guandong Province in 1978. A more localized outbreak of mild DF due to DEN-1 occurred in Zhongshan County, Foshan Prefecture, Guandong Province in 1979, followed by a large outbreak caused by DEN-3 on Hainan Island in 1980. No annual report has been received regularly from the Government of China, however, a major epidemic seems to have

occurred in 1983, with 85 293 cases and 3 032 deaths. In 1985-1986, DEN-2 infected DF occurred in also Hainan Island. Majority of patients in China were adolescents and adults, and multiple peripheral paralysis such as facial palsy was observed as unusual clinical manifestation in the report (Qiu FX et al. 1993). In 1989, 37 886 cases with 807 deaths were reported, however, it was reduced to 376 cases with no deaths in 1990 and it was increased again to 46 860 cases (uncleared number of deaths) in China.

Cambodia/Lao Peoples Democratic Republic (Lao PDR)/Viet Nam (Fig. 4); In Cambodia, DF/DHF has been ranked as one of ten leading causes of hospitalization and death. Statistics from the National Center for Hygiene and Epidemiology (CNHE) in

	'60-'64	'65-'69	'70-'74	'75-'79	'80-'84	'85-'89	'90-now
China				21227	85293	26698	23618

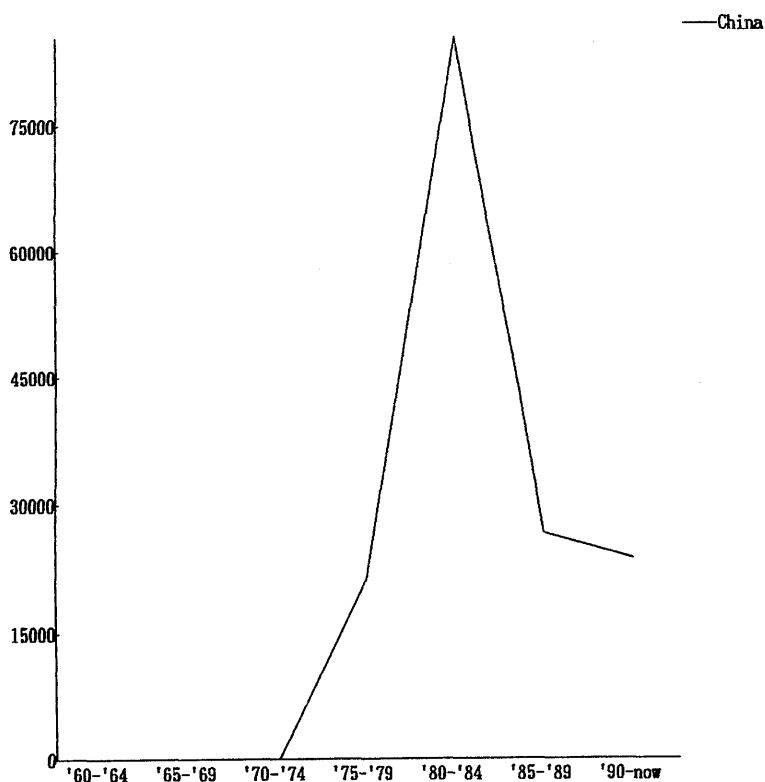


Fig. 3. Mean annual DF/DHF cases in every 5 years period —China—

Phnom Penh show that the number of cases has steadily increased since 1980. In 1990, there was a large outbreak with 7259 cases and 331 deaths. The case of fatality rate has been very high in Cambodia ranging from 3.6 to 12.4% compared with 0.3 to 1.0% in Thailand over the same period. The means of prevention and control of DF/DHF are still inadequate in Cambodia. Total number of DHF in Cambodia in 1992 was approximately

	'60-'64	'65-'69	'70-'74	'75-'79	'80-'84	'85-'89	'90-now
Cambodia					1205	3097	4526
Lao PDR				37	38	2100	154
Viet Nam	472	8845	292	38054	68767	132763	61080

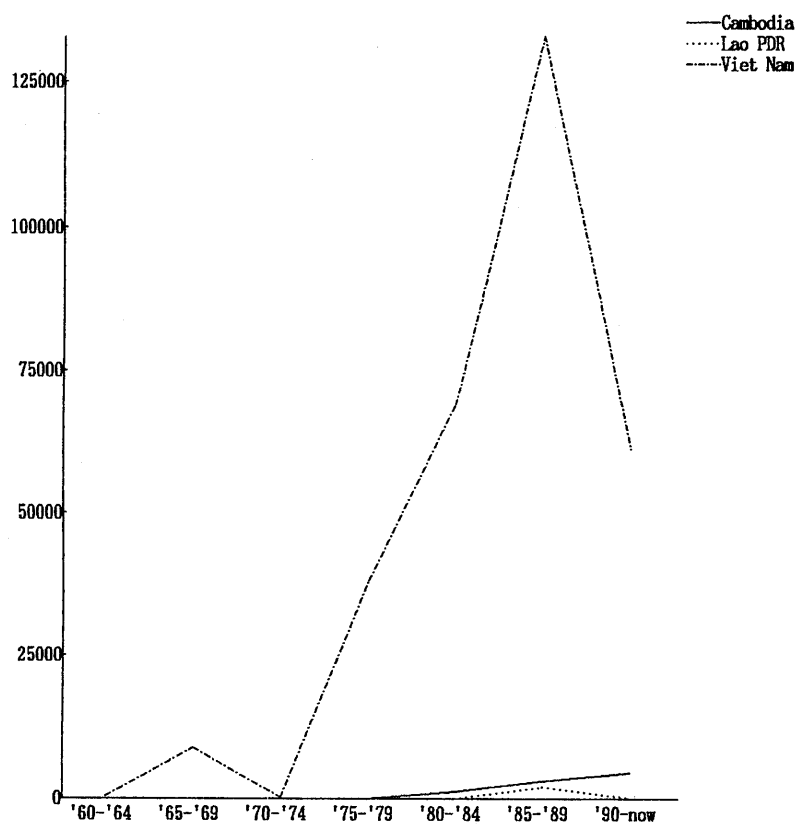


Fig. 4. Mean annual DF/DHF cases in every 5 years period—Indo-China Peninsula—

4800 cases with 172 deaths which was lower than 1990, year of biggest outbreak in Cambodia, but higher than 1991.

In Lao PDR, the big epidemic of DF/DHF was experienced in 1985-1988. Data Bank/WPRO records only 365 cases with 43 deaths in 1986 and 1212 cases with 27 deaths in 1988, however, 9699 cases with 295 deaths in 1987 were indicated in the WHO Consultant's mission report (T. Fukunaga, 1990) and 5263 cases with 91 deaths in 1989 were indicated in another WHO consultant's mission report (A. Igarashi, 1991). It has been reported irregularly to WHO and more unreported cases may have existed because of poor reporting system in the country.

Viet Nam reported highest number of the case in the Region. High prevalence of DF/DHF was observed for the first time in south Viet Nam in 1960 and in northern Viet Nam in 1969. The biggest outbreak occurred in 1987 with a total of 354 517 cases with 1566 deaths, however, these past few years, there has been no big outbreak like in 1987.

The reporting system on communicable diseases including DF/DHF in both Lao PDR and Cambodia is poor, however, it is strongly supposed that more cases and larger epidemic on DF/DHF have existed in these countries due to the similar situation in the neighboring countries such as Viet Nam and Thailand.

Malaysia/Singapore (Fig. 5); In Malaysia and Singapore, they had outbreaks in 1965-1969 and 1970-1974 respectively. Case number had been reduced since a nation wide DF/DHF control programme was implemented, however, from 1980s, case number has been again increasing gradually and now the number is higher than last big outbreak in both countries.

The up-dated epidemiological information in Cambodia, Lao PDR, Viet Nam, Singapore and Malaysia are shown in elsewhere in this volume, respectively.

Philippines (Fig. 6); The outbreak in 1986 was the largest one in the Philippines. The number of cases was 9 384 and deaths was 250. Since then, the number had been decreasing gradually, however, it has been increasing again since 1982. The patient number in 1990 was 4 836 with 363 deaths. Incidence and mortality rates from 1958 to 1989 is indicated in Table 1. It is clear that incidence rates became higher during these 7 years, however, mortality rate showed constantly 0.2-0.5% in the Philippines. Incidence rate under 1 year old is 10.5 per 100 000 population, the highest age group, and it goes down by age. Mean incidence rate in all ages is 3.0. Highest mortality rate is also indicated under 1 year old with 2.5 per 100 000 population and second rank is 1-4 years old age group with 1.0. Mortality rate in the age group older than 5 years old is from 0 to 0.6 and the mean mortality rate in all age is 0.4.

South Pacific Countries (Fig. 7); Table 2 shows the mean annual number of DF/DHF cases in every 5 years period in the South Pacific Countries and Fig. 7 indicates them in a figure. After virtual absence of 20 years of DF/DHF in the South Pacific, it has been

endemic since 1970s. The biggest outbreak was observed in French Polynesia in 1979 and the outbreak in French Polynesia in 1989 followed as the second biggest outbreak in the South Pacific. In 1964, the dominant type of dengue virus was DEN-3, however, DEN-2 was dominant in 1971-1972, DEN-1 in 1975-1978 and DEN-4 was isolated in 1979-1980. DEN-1 and DEN-3 are dominant in recent years.

We could find two groups on peak of outbreak in the South Pacific as shown in Fig. 6. One group has epidemic peaks in 1975-1979 and/or 1985-1989 such as French Polynesia,

	'60-'64	'65-'69	'70-'74	'75-'79	'80-'84	'85-'89	'90-now
Malaysia			1843	798	1162	1532	6628
Singapore		623	333	144	179	421	1956

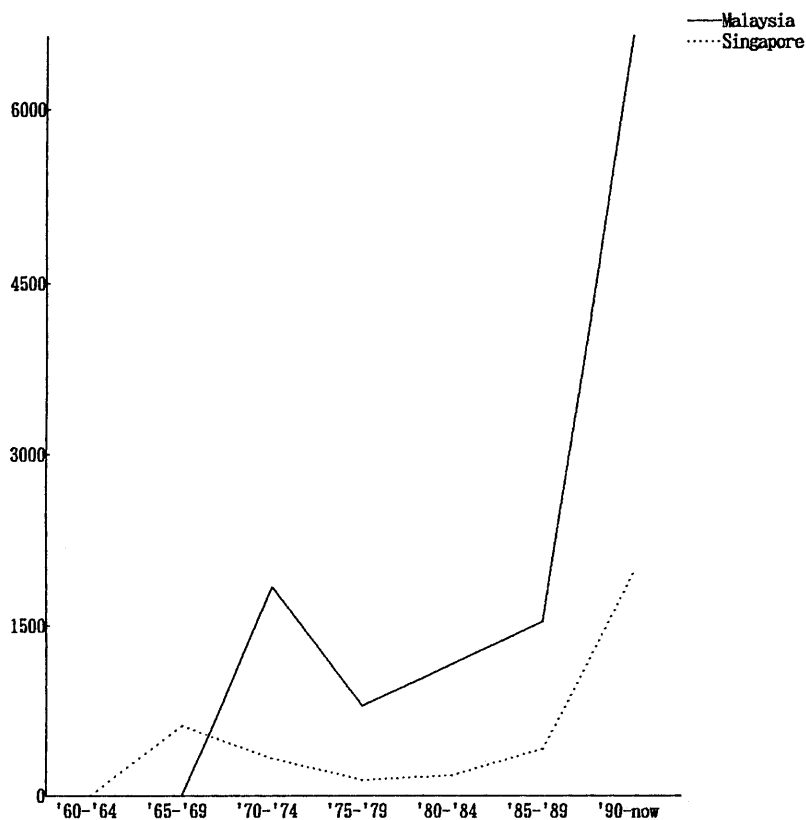


Fig. 5. Mean annual DF/DHF cases in every 5 years period —Malaysia/Singapore—

New Caledonia, Western Samoa and Wallis and Futuna. The other one has peaks in 1980-1984 such as Cook Islands, Nauru, Niue, and Tonga. The case number has been increasing since 1990 in Cook Islands, Fiji and Tonga.

DISCUSSION

DF/DHF is recognized as one of the major public health problems in most of the

	'60-'64	'65-'69	'70-'74	'75-'79	'80-'84	'85-'89	'90-now
Philippines	618	2772	861	563	1193	2095	3100

data collected in DOH/PHL

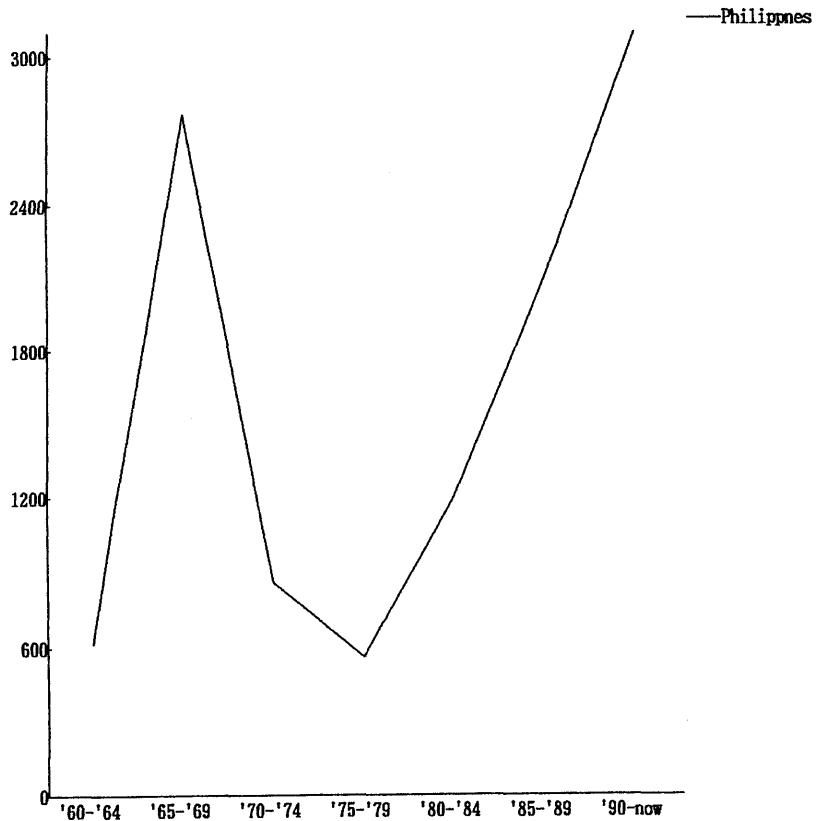


Fig. 6. Mean annual DF/DHF cases in every 5 years period —Philippines—

Table 1. Incidence and mortality rates of dengue hemorrhagic fever: Phils, 1958-1989
Rate per 100,000 pop.

Year	Incidence	Mortality
	Rate	Rate
1989	3.7	0.3
1988	4.8	0.5
1987	3.0	0.4
1986	2.9	0.3
1985	3.8	0.4
1984	4.7	0.2
1983	3.2	0.6
1982	1.6	0.4
1981	0.7	0.2
1980	1.3	0.2
1979	0.9	0.4
1978	0.8	0.5
1977	1.6	0.5
1976	1.3	0.4
1975	1.7	0.4
1974	1.6	0.4
1973	1.8	0.5
1972	4.0	0.2
1971	1.2	0.09
1970	2.5	0.2
1969	3.6	0.3
1968	3.1	0.3
1967	4.0	0.3
1966	28.0	0.7
1965	2.0	0.3
1964	2.4	0.5
1963	0.6	0.2
1962	0.5	0.2
1961	5.1	0.1
1960	2.0	0.1
1959	0.1	0.04
1958	0.4	0.1

countries in the Western Pacific Region such as China, Philippines, Malaysia, Singapore and the countries in Indo-China Peninsula. In the South Pacific, several countries had an outbreak of DF/DHF from 1970s and it is now endemic. There is no cure nor practical available vaccine against the disease at the time. Disease surveillance and virological diagnosis must be improved so that endemic countries in the Region have more accurate information and proper case management. However, the shortage of trained personnel, facility and equipment for clinical and virological diagnosis is a big obstacle in the most of the DF/DHF endemic countries, in the Region.

The forty-sixth World Health Assembly, WHO, in May 1993 called for global action

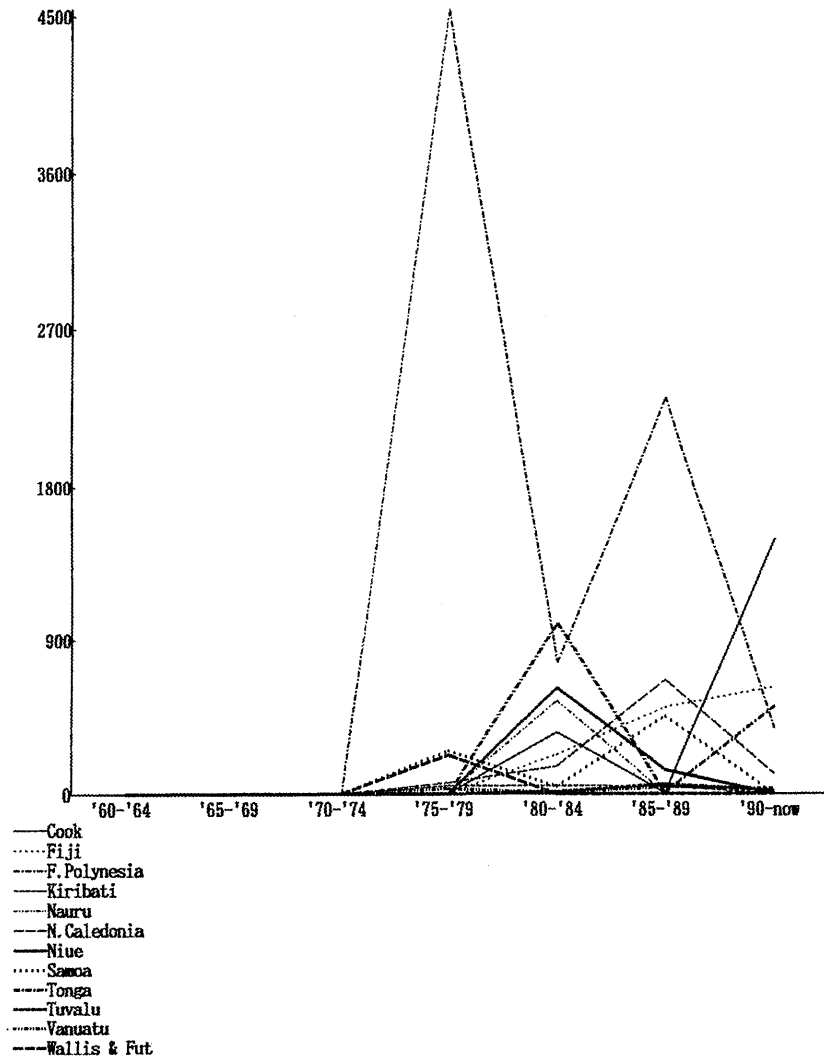


Fig. 7. Mean annual DF/DHF cases in every 5 years period —South Pacific Countries—

Table 2. Mean annual DF/DHF cases in every 5 years period —South Pacific Countries—

	'60—'64	'65—'69	'70—'74	'75—'79	'80—'84	'85—'89	'90—now
Cook					357	5	1494
Fiji				4	230	501	619
F. Polynesia				4543	771	2315	383
Kiribati				49	51	45	0
Nauru					538		
N. Caledonia				66	160	662	119
Niue					618	138	
Samoa				248	43	450	2
Tonga					1000	6	505
Tuvalu					15	58	19
Vanuatu				31	9	39	32
Wallis & Fut				222	1		0

to control DF/DHF and urges Member States to strengthen national and local programmes for prevention and control of DF/DHF.

This biennium WPRO supported study programmes of fellows from China and Viet Nam to Indonesia for DF virological study; and from Laos and Viet Nam to Thailand for case management study. WHO consultants were provided for Viet Nam and Laos for an assignment on laboratory examination. DHF control committee has been organized in the Ministry of Health in Cambodia and the activities has been strongly supported by WHO and other international agencies. Printing manual on DF case management in local language was supported in Cambodia and Laos. Training courses on epidemiology, laboratory examination and case management were held in Viet Nam, Cambodia and Laos. In connection with South East Asia Regional Office (SEARO), the Dengue Newsletter is published annually for exchanging and sharing information on DF/DHF situation in both SEARO and WPRO.

Vector control of DF/DHF has been under Vector-Borne Control unit responsibility in WPRO and emergency supplies of mosquito nets and insecticides were provided to the South Pacific. Manual on vector control of dengue virus will be published by WPRO.

DF/DHF prevention and control should be among WPRO's high priorities and advance in implementation activities should commence.

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REFERENCES

- 1) Fukunaga, T. (1990): Prevention and control of other communicable diseases, Lao PDR. WHO Assignment Report (WPRO), 26 March 1990.
- 2) Hammon, W. McD., Rudnick, A., Sather, G. E. (1960): Viruses associated with epidemic hemorrhagic fever of the Philippines and Thailand. *Science*, 131: 1102–1103.
- 3) Hotta, S. (1965): Twenty years of laboratory experience with dengue virus. *In* Saunders, M. and Lennette, E. H. (eds.). *Medical and Applied Virology*, Green, St Louis.
- 4) Igarashi, A. (1992): Training course on the laboratory diagnosis of viral infections, Lao PDR. WHO Mission Report (WPRO), RS/91/0604.
- 5) Sabin, A. B. (1948): Dengue. pp. 445–453. *In* Rivers T. M. (ed.). *Viral and Rickettsial Infections of Man*. Lippincott, J. B., Philadelphia.
- 6) Singapore (1989): Outbreak of the disease in 1960. *Epidemiological News Bull.* 15 (10): 55–58.
- 7) Qiu F. X., Gubler, D. J., Liu, J. C., Che, Q. Q. (1993): Dengue in China. *Bull. WHO.*, 71: 349–359.
- 8) Quintos, F. N., Lim, L. E., Juliano, A., Reyes, A., Lacson, P. (1954): Hemorrhagic fever observed among children in the Philippines. *Philipp. J. Ped.*, 3: 1–9.
- 9) for general references (1): *Dengue Newsletter*. Vol. 1-Vol. 18, SEARO/WPRO, WHO.
- 10) for general references (2): *Western Pacific Region Data Bank on socioeconomic and health indicators (Annual report)*. WPRO, WHO.